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ABSTRACT

This article examines distance learning from a gender perspective. In any new area of enterprise, expectations have an important effect on planning, implementation, and evaluation. When it comes to distance learning, a variety of images of what this exciting new technology will look like and what it can empower us to achieve will determine how we develop it. In a study about technological experts' expectations and desires for their own technologies, the fantasies articulated by women and men are different in important and predictable ways. Women wish for small, appealing objects that allow them to collaborate, to create, to share their work, and to integrate their work and home lives. Men wish for magic wands that give them enormous power, fabulous speed, and infinite wisdom. This culturally sanctioned difference in technological expectations has real implications for the future of distance learning. Both perspectives are needed if distance-learning technology is to be successfully integrated into our school system. (Contains 6 endnotes.) (Author)

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Gender and Distance Learning

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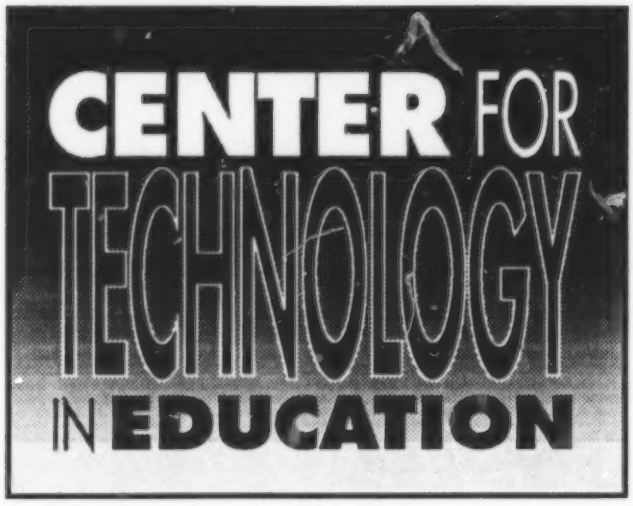

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Gender and Distance Learning

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January 1992

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GENDER AND DISTANCE LEARNING

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This article examines distance learning from a gender perspective. In any new area of enterprise, expectations have an important effect on planning, implementation, and evaluation. When it comes to distance learning, a variety of images of what this exciting new technology will look like and what it can empower us to achieve will determine how we develop it. In a study about technological experts' expectations and desires for their own technologies, the fantasies articulated by women and men are different in important and predictable ways. Women wish for small, appealing objects that allow them to collaborate, to create, to share their work, and to integrate their work and home lives. Men wish for magic wands that give them enormous power, fabulous speed, and infinite wisdom. This culturally sanctioned difference in technological expectations has real implications for the future of distance learning. Both perspectives are needed if distance-learning technology is to be successfully integrated into our school system.

The scene is Ben Franklin High School, Smalltown, Pennsylvania, in the not-too-distant future. Students file into a classroom and head for their seats. They sit in groups of four around square tables. As they settle down, they pull electronic notebooks out of their satchels and plug them into a central computer box in the middle of the tabletop. The notebooks consist of an 8.5 by 1.5 inch color screen, covered by a thin pressure-sensitive tablet that can be folded down and used as a graphics pad with a stylus or a soft-key keypad. The screens are filled with a variety of windows containing directories of students' work and of the library's central catalogue, tool boxes for graphics, word processing, multimedia production, microworlds and thinking aids, and communications folders including electronic mail, bulletin boards, and access to a number of local, national, and international educational information networks. The center post beneath the table contains dual-deck audio and video tape-recording equipment, a laser disc player, and optical storage devices.

The teacher calls the class to attention. Conversation continues at a somewhat reduced volume until a man's face appears on the large television screen at the front of the classroom. The teacher adjusts the volume and the man can be heard to say:

> Welcome to the State University's Education Program in Social Studies. Hello. I am Professor Matthew Megabrain. Today's topic is "The Civil Rights Movement of the Nineteen Sixties: Bloodless Revolution or Tempest in a Teapot?" And now, students, as usual, we will start with a general knowledge diagnostic, so get your response pads ready. Facilitator, the follow-up activities for today's presentation can be found on page 116 of your Learning Environment Guide.

The "general knowledge diagnostic" turns out to be a telequiz in which students participate in a kind of interactive game show by signaling which of several statements or images they think best describes the answer to a question posed by the professor. The questions usually follow a short video-audio segment, mostly archival news footage, and ask the students to name, identify, or match people, places, and events of the period. The bottom of the large television screen shows a continually changing histogram representing

the frequency with which students in all parts of the county are choosing each of the answer options. After a few seconds' delay, when all the answers to a question have been registered, the correct column in the histogram lights up and turns bright yellow while the remaining three or four columns turn a pale grey. This is invariably followed by groans and exclamations from students in the classroom. Every now and then, when there is a particularly spectacular mismatch between the most commonly chosen answer and the correct one, a chorus of groans can be heard over the airwaves, and the professor says, "That was Central High School in Niceville, Oklahoma, folks, our participating classroom for today!"

When the quiz is over, the professor says,

> Well! I can see that there are a lot of holes in *your* factual knowledge of this period. hope today's presentation will help you fill some of them, but I am mostly interested in letting you make up your own minds about the real importance of that period in our history for the present day. We are currently facing many or the same issues your grandparents faced in the 1960s. I hope there is something we can learn from looking at the actions they took and at how the consequences of their decisions are still shaping our lives today.

He then launches into a lively, well-produced multimedia presentation, consisting of more news footage, clips from documentaries, still pictures, short pieces of audio interviews with civil rights leaders, excerpts from speeches, and attractive still and animated graphics representing demographic and other statistical data about various ethnic groups both in the 1960s and the present.

The major question underlying his exposition seems to be whether the unrest of the 1960s constitutes the beginning of a process of slow but steady reform or was merely a kind of letting-off of steam that accomplished no lasting change but rather served to maintain the status quo by giving African Americans the illusion that things could change while not taking any power away from the ruling class. It is clear that this question does not originate with the professor, but rather reflects the thinking of a growing group of radical left-wingers recently much in the news, who are calling for armed revolution. The tenor of Professor Megabrain's presentation would lead one to believe that the radical fringe group is wrong, that they do not understand the process of American democracy, and that, furthermore, statistics clearly show improvement in the living conditions of minorities during the last half century.

After the presentation, there is an open-mike discussion with the students in the participating school. On a split screen, the Smalltown students watch the faces of their peers in Niceville as they ask the professor questions about the lecture. When the comments about the the students' questions, appearance, accents, or personalities become too raucous, Mrs. Helpmeet, the facilitating teacher, asks the class to quiet down and listen to their Oklahoma peers—they might learn something!

When one Oklahoma student asks whether the living standard among blacks has risen at the same rate as the living standard among whites, Professor Megabrain exclaims:

> I'm very glad you asked that! It brings up an interesting point about the way social scientists use statistics. In the introduction to another presentation in this series, "Statistics for the Social Sciences," Professor Stanley Highbrow demonstrates how statistics have been used to both enlighten and manipulate throughout the twentieth century. For now, however, our time is up. Thank you for participating in a really good discussion. I hope you find the follow-up activities useful. If you have any questions, address them to me at my electronic mailbox on the national network. Until next time, this is Matthew Megabrain, saying goodbye to you, live from the State University Education Program.

Funding credits scroll across the screen. The teacher turns it off and tells the students that the follow-up activity work screens can be found in the"Mid-Twentieth Century" folder in the social studies directory. There is an audible group sigh as students turn toward their notebook screens. They call up the work screens and start discussing where, in the just-videotaped lecture, they might read the answer to the first question. One student can be heard to say, "No, stupid, you have to rewind all the way to the beginning. The questions always follow the order of the presentation!"

Distance Learning as Technological Innovation

Technological innovations produce potential rather than reform. They also bring new problems. We are continuously forced to find new ways to neutralize and counteract

the forces unleashed by the technologies we have created, like the hole in the ozone layer, the pollution of the earth, or the threat of nuclear annihilation. We can conclude from this that technological developments are going too far too fast, or we can consider the side effects of technology a necessary price to pay and expect the same ecological progress that created them to find successful ways of coping with them. Educational technology is not exempt from this controversy. Some educators expect that distance-learning technologies will evolutionize our schools. Others worry that the technologization of our schools means that robots with televisions for brains will replace the old-fashioned classroom teacher, much as gigantic educational factories have replaced the one-room schoolhouse. Others fear that this newest wave of technological innovation will be as irrelevant to the basic processes and problems of our schools as previous ones, from public-address systems to microcomputers, have been.

The fantasy about distance-learning technology in Smalltown, Pennsylvania would probably strike most educators as entirely realistic. We are forewarned that the integration of new technology into the regular public school classroom is a tricky business. We have seen that slides, filmstrips, televisions, copy machines, tape recorders, and computers frequently end up as not much more than newfangled high-tech furniture added to the basic structure of the classroom. While it is clear that these technologies have the potential to enrich classrooms and create the necessary preconditions for discovery learning, they often end up being used as occasional visual aids to the teacher's lecture rather than as raw material for the students' learning experiences. Other structures in the school universe, from standardized multiple-choice tests to the bell schedule, militate against the genuine integration of technologies into classroom practices.

Distance-learning technology has the potential to open the world to students, teachers, and parents. It can offer them the opportunity to see how others think and feel and educate their children; it can provide a forum for new ideas, for thoughtful analysis, and for better information. But in themselves, distance-learning technologies are not guaranteed to do any of these things. We are just beginning to consider the role that distance learning can play in the reform of our educational system. The discussion about school restructuring and the integration of educational psychology into curricula is beginning to include distance-learning tools as part of the equation. Within the framework of this discussion, we talk about the needs of students and teachers as well as of society as a whole, but there is a noticeable absence of any mention of gender in that discourse. We are once again assuming that technology is neutral, and we are ignoring the impact of gender—with all that it implies about feelings, roles, and expectations—on technology.

Gender and Expectations of Technology

There is a growing body of research documenting a gender difference in the way we use technology. The facts are familiar: boys are trained early on to tinker, to get their hands dirty, and to build things; girls are trained to take care of things rather than to invent them, to depend on others to fix, run, and understand machinery. Women and men use different kinds of technologies on the job. Most high-tech hobby equipment is purchased by men. Some of these differences have been attributed to differential access to technologies. But even when girls are encouraged to play with machines, they use them differently from the way boys do. When professional women know every bit as much about some piece of machinery as their male peers, there is still a difference in the ways women and men feel and think about the technology they know.

In a recent study, technology experts—women and men—were interviewed about their careers.[1] A subset of the sample, ranging from filmmakers to computer programmers and from architects to aerospace engineers, were asked to fantasize about future developments in their own area of technological expertise. They were also asked to describe how they might pose for a normal portrait depicting their relationship to the instruments of their work. The purpose of this part of the study was to get a better glimpse of the kinds of informed expectations women and men place on technology. The difference in their responses is particularly relevant to the future of distance learning.

While there was overlap between the sexes in general attitude—men who disliked machines and women who were excited by them, women who loved the control that technology gave them; and men who saw technology as modest tools in a larger human enterprise—there was a definite and characteristic

gender difference in the way in which most of the experts in this study fantasized about the function of technology.[2]

The women in this study saw their technological instruments as people connectors, as communication and collaboration devices. The men tended to see them as extensions of their power over the physical universe. On the whole, the women's technological fantasies were sensual, were embedded in human relationships, served to integrate their public and private lives, and were relatively modest in aspiration. The men's far more epic technological fantasies were about absolute power, tremendous speed, and unlimited knowledge.[3] These women wanted small, unobtrusive, portable technology that would allow them to work, create, and communicate anywhere, like a pocket-sized gadget that is both a flute and a video camera, or a beautiful medallion worn like a necklace that serves as an input device into a computer network. Even when women's machine fantasies were quite ambitious, as in a holographic "thought net" that could be used to send one's visual and auditory compositions to friends in faraway places, they were situated in a real world with real people, and their purpose was to share and communicate rather than to control.[4] Often, the technological desires expressed by these women were quite modest and pedestrian. They were not likely to lead to breathtaking technological innovations because they were mostly attempts at improving available technology rather than inventing whole new uses for it.

The kinds of fantasies produced by the men in this study were in keeping with the values and belief systems that our mainstream culture considers masculine. Men wanted magic wands that could alter reality rather than merely facilitate a creative process. They wanted to move mountains, create fertile valleys, zap whole cities into existence by a single wave of the hand or blink of an eye. Men's fantasies were mostly about machines that would vastly enhance the power of their user, allowing them to bypass the physical process of creation and to have an immediate and profound effect on the universe. The fantasies produced by women were in comfortable accordance with our notions of femininity. They were mostly about facilitating communication between people, integrating work and home life, and sharing ideas and imaginings with friends in distant places. The desire for communication tools, for ways to use machines to facilitate communal work in human settings, to function as handmaidens or midwives to creative processes is congruent with the ways in which our culture constructs femininity. The desire to transcend the body altogether, to enhance the power of one's mind beyond the bounds of matter are processes that our culture associates with masculinity.

In one sense, this study demonstrates that experts' expectations of technology tend to be in accordance with cultural prescriptions for gender, even though the women in the sample have broken with gender expectations to arrive at their position of technological expertise. Technology, after.all, is a male-dominated field, and it is no wonder that so many of us are suspicious of technology. It is frightening to think that the pervasive fantasy behind technological development is a desire to replace nature itself and have the universe reflect men's thoughts instead.[5] To many of us, women and men, this fantasy is a nightmare of domination, in which a single brain can create and run an entire planet. An alternative vision would prefer to tame technology rather than nature, to use it to enhance relationships rather than power, and to free the body and the mind to engage in more creative activities rather than to free the mind from the body. Yet we are dependent on the technology that those very epic, masculine dreams have produced—without them, few of the technological miracles we rely on to maintain our increasingly extended social networks would have come to pass.

Technological Fantasies and Distance Learning

The implications for the future of distance learning of this gender difference in technology expectations are critical. As with all discourse about gender differences, great care must be taken to differentiate the cultural construction of gender from notions of biological determinism. To call a notion, a set of values or beliefs, or a kind of behavior masculine is like calling it American. It neither implies that all citizens of the United States adhere to it, nor does it make those citizens who do not share in it foreigners. We apply a cultural label because it describes a culturally shared history, perception, or expectation. Cultural labels usually have prescriptive as well as descriptive meaning. The value of

that meaning may vary for different groups. Young radicals and old conservatives might agree quite closely on what it means to be un-American in one's attitude toward a particular issue, but while the latter would consider the term an insult and an accusation, the former would take pride in their oppositional stance, considering anything American narrow and provincial by definition.

Depending on one's perspective on present gender arrangements, then, adherence to the prescriptions considered appropriate to one's biological sex can seem either a virtue or a defeat. The problem comes with discrimination rather than with difference. Gender discrimination, like excessive patriotism, tends to exclude one part of the continuum or the dichotomy implied by a cultural label from the general discourse. That is the real danger of ignoring gender in the discourse about a new social development such as distance learning: it increases the likelihood that policy makers will neglect to take into consideration that (1) there are alternative points of view, and (2) the best course of action is generally based on some kind of consensus of or collaboration among people with a variety of perspectives.

The vignette at the start of this article reflects an uneasy compromise between masculine expectations of technology and the mundane reality of our school system. Dreams of fabulous access to the universe, of fantastic journeys to faraway places and long-ago times, guided by the great minds of the age, are likely to end up being realized in the form of a smart university lecturer with fancy visual aids telling youngsters what to think. A more feminine vision, however, one in which the opportunities are created by the ability to connect people and places in a common enterprise, is perhaps more modest but might come closer to developing some of the genuine potential of distance-learning technology to reform our educational system.

At present, as described in the Office of Technology Assessment's review of distance learning,[6] this new technology seems to be understood primarily as a way to stretch existing resources in order to provide needed services to educationally underdeveloped areas. There is nothing particularly masculine in the concept of a network. On the contrary, the idea of connecting schools in outlying areas to the larger community, of being able to offer students a greater variety of courses and a wider choice of perspectives on a content area by allowing them access to people in other parts of the country sounds like the fulfillment of the kind of technological wishes women in the gender and technology study articulated.

A more masculine vision emerges, however, as soon as we think of distance learning as a way to deliver education to more people faster and across greater distance. In this vision, it is assumed that the average, run-of-the-mill local teacher is good enough to teach the basics but that technology is needed for more complex subject areas, for extra languages and advanced science courses, disciplines in which there are no certified experts in poor or isolated areas of the country. There is some discussion of the ways in which distance teaching differs from classroom teaching. Classroom teachers have to be good with people, while distance teachers have to be good performers. Technology is used to deliver educational content. Classroom teachers supervise the students' reception of that content. What goes without saying is that most of the classroom teachers are women, particularly in the lower grades, and that most of the administrators, technicians, and experts likely to plan, implement, and supervise distance learning are going to be men. The local teachers who feel comfortable enough with new technologies to be the first to experiment with them, even in the context of a larger demonstration project, are also more often likely to be men than women. As a result, a masculine expectation of the true potential of distance-learning technology is likely to dominate. In concrete terms; that is likely to mean that new distance-learning technologies will be designed to increase educational efficiency and productivity, notions that may resonate with the business community but that leave many educators cold.

Large-scale computer systems that can deliver comprehensive educational packages to entire school systems, including assessment tools and scheduling software, are quite popular in some areas of the country. They promise efficiency and they probably deliver it, too. Yet many educators question the value of that kind of homogeneous, lockstep education. Teachers whose classes score higher on standardized multiple-choice tests can be considered more productive because the state, which measures educational success by these tests, is getting more for its money. Yet we know that much of what constitutes genuine education for children, what helps them to think critically and to

learn independently, is not measured by these tests. Teachers complain everywhere that they have to make a choice between teaching for testing and teaching for learning. There is no answer; only children whose future is secure can afford to ignore the tests by which we decide their educational fate.

The recent effort to bring television news into classrooms has a similarly masculine flavor. Apparently, our children do not know much about current events. We know that they watch a great deal of television. It seems efficient to put the two together: let them watch television news in school. Since regular news broadcasts evidently fail to interest youngsters, piping television news right into the classroom means that a teacher can make sure everyone pays attention and can answer any questions that might come up. Nowhere in this grand plan to rectify our nation's ignorance about world events is there any real provision for the more feminine idea that children ought to have an opportunity to discover that the same world event is interpreted quite differently by different groups. A transatlantic plane crash caused by Middle Eastern terrorists does not mean the same thing to a child whose chances of ever taking a plane across the Atlantic are minimal and whose ancestry is Lebanese, as it does to a child who comes from a first-generation Italian family that regularly visits or is visited by old-country relatives. Yet the voice of the narrator assumes that there is a single, reasonable point of view about this event; he sounds as if he is merely reporting the facts. Together with the satellite system that allows us to bring his report into thousands of classrooms, we need tools that allow the students and teachers on the receiving end to analyze his assumptions, to find out more about these supposed facts, the ones that found their way into the 60-second report and those that, for editorial reasons, ended up being left out. We need technology that allows children to make up their own minds about world events, that gives them the opportunity to talk with peers who live in areas of the world where the very same so-called terrorists are lauded for heroic sacrifices for their people.

Much of the talk among educational reformers, regardless of gender, concerns restructuring schools to allow for more collaborative learning. Reformers want to create smaller, more intimate schools with flexible class hours and time for teachers to create interdisciplinary curricula for project-based discovery learning among students. Such reforms would support alternative forms of performance-based assessment and student self-assessment. Distance-learning technologies can provide a good deal of support for these more feminine dreams. Networks can be used to connect students to each other to work on common projects. They can allow teachers to plan together and create together from home and in school without the bottleneck of scheduling difficulties. Two-way video and audio connections can allow students to interview experts and ask them the questions that grow out of their own investigations. Computer links can allow students and teachers to share their work with each other and with the communities in which they live. Parents can participate in discussions about school matters without having to physically attend parent-teacher association meetings.

All of these more feminine kinds of distance-learning activities are probably being tried out in different parts of the country. Some of them are described in the Office of Technology Assessment's review. The difference is not in the technology but in the uses to which it is put. The further progress of this technology, what aspects we develop at the expense of what other features and possibilities, is likely to depend on the uses we consider primary. As long as we see the potential of distance-learning technology through the lens of a masculine fantasy, our money will go into hardware rather than teacher training. We will develop machines with enormous, brilliant capacities that no ordinary classroom teacher really knows how to use. Our educational agenda will be subordinated to the requirements of technology. We will plan around our existing technology rather than around the needs of our students. The lessons of the future will be technology driven rather than pedagogy driven. If we manage to include a more feminine fantasy of distance learning, we will use available technology to allow for small but meaningful changes in our instructional practice. Teachers will become better at what they do already and will ask for technologies to support their work. Students will use technologies to conduct genuine inquiries into their world. Without some masculine fantasies of technological power, technological development would not continue to proceed at its present amazing pace. Fantasies of power make the impossible happen. If, on the other hand, we ignore feminine fantasies of technological communication, we will continue to let technological development outstrip psychological and

social development, and when the inevitable, unanticipated consequences of large-scale technological solutions become clear, we will once again be unprepared to deal with their fallout.

Another Distance-Learning Fantasy

The scene is back in Smalltown, Pennsylvania, same time, same place, but a differently gendered fantasy.

Students file into a classroom and head for their seats. They sit in small groups at round tables scattered all over the room. As they settle down, some pull electronic notebooks out of their satchels and plug them into the central computer box in the middle of the table top; others pile books and papers and videotapes on the table. Conversations are lively and boisterous. Everybody seems intent on sharing what they have collected: "What did you find out? I got a whole lot of neat stuff on the music of the sixties. Wait till you hear some of the lyrics—they are wild!" "I got my grandmother on tape—she went to a whole bunch of demonstrations about this war they were having in Asia. She got gassed and everything! You'd never believe that my sweet old granny would have done something like that!" "I think those people on the news, those revolutionaries—I think they're wrong. I don't think things are even worse now than in the 1960s. I think they just want to make trouble. My father says they're just kids who have nothing better to do, like my father and his friends used to go to the beach and raise hell when they were young, and that's all these guys are doing, but they're getting all that attention from the press."

Mrs. Helpmeet claps her hands and says, "Hello, everybody. Can I have your attention for a minute, please. Thank you. There is a documentary on the civil rights movement of the 1960s on the educational channel in five minutes. How many of you want to see it? Hands, please." More than half the student raise their hands. But there are some protests, mostly complaints that they know all about the civil rights movement and that they are studying another aspect of the 1960s history. Mrs. Helpmeet says, "Fine, in that case we will watch it on the big screen. Those of you who want to continue with other project work, go right ahead; either wear headphones or go to the library. The documentary will take about 40 minutes. Michelle, will you turn on the TV, please?"

Most students settle into their chairs; electronic notebooks, graphic pads, and soft keyboards are ready for note-taking. A few students get ready to tape the documentary off the air for later use in their research. A head appears on screen and begins to speak:

> Welcome to the State University's Education Program in Social Studies. Hello. I am Professor Matthew Megabrain. Today's presentation was produced by a team of high school students from Niceville, Oklahoma. Their social studies project was designed to answer the question: The civil rights movement of the 1960s: bloodless revolution or tempest in a teapot?
>
> I'm sure most of you have seen news reports about a group of radical political activists who claim that our historical evaluation of the contribution of the civil rights movement is all wrong. They say we are currently facing many of the same issues your grandparents faced in the 1960s, and the civil rights movement was merely a kind of letting-off of steam that accomplished no lasting change but instead served to maintain the status quo in the long run by giving African Americans the illusion that things could change while not taking any power away from the ruling class. Others say that the civil rights movement was the beginning of a slow but steady process of reform, one that can be measured by the increase in the standard of living among all segments of the population over the last decades.
>
> The Niceville students have done a lot of interesting research into this question. They have come to a definite conclusion. But I want you to make up your own minds, to check their research, and to consider their assumptions. As always, there will be an open-mike question-and-answer session with the Niceville team at the end of their presentation. The follow-up session, where your comments and criticisms of this presentation are aired, will be next week at the same time. Stay tuned—and send your work and your opinions to the State Education Channel!

What follows is a lively, well-produced multimedia presentation, consisting of more news footage, clips from documentaries, still pictures, short pieces of audio interviews with civil rights leaders, excerpts from speeches, and attractive still and animated graphics representing demographic and other statistical data about various ethnic groups both in the 1960s and the present. At the end of the presentation, students from

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Niceville briefly introduce themselves on screen. After a short intermission, the Niceville classroom appears. The voice of the first caller can be heard over the airwaves: "Hi, my name is Denise Morehead, and I'm from Central City, Minnesota. My question is this: When you show how Malcolm X was killed, how do you know it was really the Muslims that did it? It could have been that they were put up to it . . ."

A Niceville student interrupts, visibly prepared to answer that particular question: "I know, I know. I thought of that, too, at first, but then I read this article about what was happening inside the Muslim community at the time and . . ."

The dialogue continues for about 30 minutes. At one point, two students in Smalltown try to get through to Niceville with a question. An operator tells them that they are number 67 on a list of calls and that they are welcome to hold the line, but chances are that the program will be over before they get on. The Smalltown students decide to send their question via electronic mail instead and settle back to listen to the interchange on the screen.

Some of the small groups of students in the back who have been paying little attention to the presentation join in some hooting and catcalling in response to certain questions and answers. It is clear that everyone has pretty strong opinions about this matter. One group, on returning from the library toward the end of the broadcast, rejects the entire presentation: "These guys are all wrong. They have the whole question wrong. The issue isn't whether the movement had any effect, but what we should be doing now! We saw this thing that some students at this college put together, and they are doing really great stuff . . . !"

Mrs. Helpmeet turns off the television. She invites the class to settle down and discuss what they think of the presentation they just saw during the remaining half hour before lunch break. ✦

Notes

1. C. Brunner et al. *Women and technology: A new basis for understanding.* New York: Bank Street College of Education, Center for Children and Technology, 1990.

2. For example, a woman described herself sitting at her kitchen table with her computer and her cat. In her fantasy, she was interested in integrating her technology as much as possible into her home life. She domesticated it, made it into a fellow creature, a kind of useful pet. A man, on the other hand, portrayed himself sitting on top of a hill. His mind had created a large bird in the barren tree at which he was gazing. He was beyond technology, beyond even the physical realm. He had integrated technology by becoming the instrument. He talked about grounding design in nature, but the natural tree in his fantasy was barren. The man was the creator of the bird. The bird was an illusion, an idea about nature without "representation in the physical realm." There were two filmmakers who described almost identical ways of posing with their technology, but there was a striking difference between the objects on which their cameras were focused. The woman's camera was pointed at the world around her, at other people in a common, familiar landscape. The man's camera was taking a picture of his own recollection in the monitor. He was caught in an endless technological recursion of images of himself by himself. A woman and a man both included a representation of their computer's innards in their portrait. The woman included her computer's chip because it represented the connection between people and computers. The man wanted to show the artistry of the circuit boards because they represented the conceptual organization of the machine itself.

3. These dreams were about enormous power rather than mere convenience. Extraordinary knowledge, the ability to use the greatest mental power available, was another desire expressed by men in this study. While women wanted to communicate with their friends, men wanted to commune with genius. Several men imagined machines that would let them enter the mind of Gandhi, for instance, to help them solve complete problems. Not all the men in the study considered such high-tech visions benign, but even men who were wary of technology associated it with superhuman power. One man worried that his own dream about a "direct brain-to-machine link," one that would give a plugged-in user direct access to "all information from all users and all of the history of mankind," one that would not, however, enable the user to "discern the difference between dreams and reality and the information placed there by the machine," might end up being a nightmare. Another man considered that children would have to be protected from a similar kind of machine, one that makes people's entire memory public knowledge. It occurred to him that "there can be psycho-abuse by parents adding twisted data to their children's memories." His primary worry about the possibility of people living their entire lives in a never-ending computer hallucination, however, was that the universal computers would become "stifled" due to lack of new

input. His solution was to make the computer responsible not only for its own survival and maintenance but also "for the survival of the human itself."

4. There was a noticeable difference in the degree to which these women and men mentioned concern about the psychological and social implications of their technology fantasies. The women wanted to embed technology into their social networks. They talked about wanting to use it to maintain contacts with their coworkers, with their families, with friends, and with nature. Most of the men in this study either did not consider the social implications of their fantasy inventions or had a very limited impression of the likely consequences. A man who imagined a machine that would allow its user to create images merely by thinking them, who asserted that images allow for a more exact communication than do words and that his dream technology would thus "eliminate deceit and distortion" because "we could say what we mean and mean what we say," allowed as an afterthought that "this might have some impact on personal relationships." Another man, with a similar fantasy of instant thought exchange, concluded that "the inability to know where a solution or idea came from would create a tremendous redefinition of the concept of copyright."

5. C. Cohn. Sex and death in the rational world of defense intellectuals. *Signs: Journal of Women in Culture and Society. 12*(4), 687-718, 1978; C. Cilligan. In a different voice: Psychological theory and women's development. Cambridge, MA: Harvard University Press, 1982; E. F. Keller. Gender and science. *Psychoanalysis and Contemporary Thought. 1*, 1978; idem. Feminism and science. *Signs: Journal of Women in Culture and Society. 7*, 589-601, 1978; S. Turkle. *The second self: Computers and the human spirit.* New York: Simon & Schuster, 1984; idem. Computational reticence: Why women fear the intimate machine. In *Technology and women's voices: Keeping in touch.* New York: Routledge & Kegan Paul, 1988.

6. U.S. Congress, Office of Technology Assessment. Linking for learning: A new course for Education. Washington, DC: Office of Technology Assessment, 1989.